

Presenter: Peter Becker / Esri

Meeting Overview

On Thursday, January 27th, 2011, several DWR and Caltrans staff met with Esri representatives Tony Lafferty, Peter Becker and Dean Djokik at the Esri Learning Center in Sacramento to discuss DWR's GIS, Imagery, and LiDAR data management needs. The meeting blended conceptual discussions of server architecture, data management, and workflow with demonstrations of possible solutions using Esri software and recommendations for DWR's specific needs. Although the meeting focused heavily on LiDAR, there was some discussion of bathymetry data. Featured topics included ArcGIS Server, Image Services, and Mosaic Datasets. Some highlights include:

- Server architecture is important in performance optimization when dealing with large datasets, in particular imagery. A separate server for storing imagery might be a good idea for larger organizations, with an additional server for vector data and geoprocessing services.
- Image Server is now included in ArcGIS Server 10, and can be used as long as the proper extension is licensed.
- Image Services can be used in ArcGIS Desktop or through web applications to quickly display imagery and provide analysis capabilities. No caching is necessary, although it is recommended for some situations, such as web services that are primarily used for visualization and experience heavy traffic.
- Mosaic datasets are advantageous in that several datasets and images can be displayed at a variety of scales without having to create additional rasters at varying resolutions. Reduced resolution datasets called Overviews improve display speed without affecting the source data, which is accessible to the user at any point, unless accessibility options are set otherwise.
- Mosaic datasets can be distributed as Image Services and accessed using ArcGIS Desktop or web applications.
- Geoprocessing services can be developed for common analysis tasks. These services can be directed to source data while the user views and interacts with performance-optimized rasters.
- A future DWR / Esri meeting dedicated to server architecture may be a possibility.

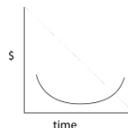
For more specific meeting details, see the notes below:

Imagery in ArcGIS

This portion of the meeting was primarily a discussion of ArcGIS Image Server and a demonstration of image services accessed through ArcGIS desktop. The mosaic dataset was heavily featured and recommended as a way to visualize and distribute large datasets as Image Services.

Notes

- Meeting is focused on making information actionable
- Discussion of trends in imagery, such as:
 - Increasing volume
 - Improved resolution (spatial + temporal)
 - More sources
 - More platforms
- Value patterns in imagery



- Current imagery is very valuable
- Recent imagery is less valuable

- Imagery gains more value once it's considered "historic" or "legacy", for example 10+ year-old imagery is valuable in time series analysis
- What are the elements of a "complete GIS"?
 - Content
 - Management
 - Dissemination
 - Visualization
 - Analysis
- About world imagery in Esri services
 - GeoEye (IKONOS) VS Digital Globe
 - Mosaicking and serving imagery on demand (every pan / zoom)
 - Not pre-cached
 - Optimized delivery speed
 - What are the space requirements?
- World Elevation
- Image Data Management
 - Who is using the data?
 - Workstation user
 - Organizations with collections of processed imagery
 - How do they serve it?
 - Which format(s) is / are appropriate?
 - Terrains + Multipoint?
 - Raster Surfaces?
 - Dynamic?
- Mosaic Dataset
 - ArcGIS Desktop 10 with ArcEditor Extension
 - Leave data in original form
 - Data cataloged with metadata
 - How data is to be processed (converted to product)
 - Custom processes can be developed in C++
 - Default viewing rules must be set for each mosaic dataset
 - User can redefine these after default
- Enhancing process methodologies
- Overview (multiple images covering large area) / Pyramid (individual images)
- Caching
 - Useful for web
- Image accessibility
 - Direct access
 - Static web services (WEB)
 - Dynamic image service (WMS, KML, WCS, SOAP, REST)
 - Image Service Explorer

ArcGIS Desktop Image Capabilities

Peter demonstrated ArcGIS Version 10's new image analysis tools, such as compositing and supervised classification. This portion of the meeting was geared toward optical remote sensing data such as aerial and satellite imaging.

Notes

- Discovery
 - Image Services
- Image Classification Toolbar

- Spatial Analyst Extension
- Image Analysis Window
 - Composites
 - Sharpening + other display features
- Image Classification
 - Training
 - Signature creation based on training

Mosaic Datasets

Steps to create a mosaic dataset in ArcGIS Desktop 10.

Notes

- Creating a mosaic dataset:
 - Create file GDB → Create new mosaic dataset
 - Creates "Boundary", "Footprint", and "Image" layers
 - "Add rasters to mosaic dataset"
 - "Build footprints"
 - "Define Overviews" + "Build Overviews"
 - To do this through ArcCatalog, select GDB containing mosaics
 - Setting mosaic dataset properties
 - Define service options, including, but not limited to:
 - Max size of requests
 - Compression settings
 - Publish mosaic dataset to ArcGIS Server
- Recommended training: Image Data Management
 - [Managing Imagery with ArcGIS 10](#)
 - Free / 60 min / training seminar
 - [Managing Imagery Using ArcGIS](#)
 - Instructor-led / 2 days / \$980
 - [ArcGIS Server: Web Administration Using the Microsoft .NET Framework](#)
 - Instructor-led / 3 days / \$1470
- [What is a Mosaic Dataset?](#)

Image Server

Tips on serving mosaic datasets using Image Server.

Notes

- Comes with ArcGIS Server 10
- Need extension license
- Can be used to serve mosaic datasets
- For larger organizations, it's recommended to separate imagery from vector
 - Improves speed
- Tip: try to make as few image services as possible
- Useful help article: How to scale services
 - Image Service concepts:
 - Service of services
 - Replication of individual services and synchronization
 - Master service that points at individual services
 - [ImageServer 10 Help](#)
 - [ArcGIS Server Image Extension Site](#)

- o [ArcGIS Server Help](#)

Managing and Serving Image Data

This section focused more on the technical details of ArcGIS Server and Image Services, including recommendations for managing bathymetric data using mosaic datasets and image services. It also touched on Geoprocessing Services, which can be applied to high resolution data sources on the server (“in the background”) while the user interacts with imagery optimized for speed and deliverability.

Notes

- Review of uses of elevation data
- World elevation data sources
 - o SRTM
 - o GTOPO
 - o 30m US elevation data
- Orthorectified VS ellipsoidal heights
 - o Both can be used in Image Services, much to Joel’s disbelief
- Image services available as web services include:
 - o Hillshade
 - o Profile
 - o Geoprocessing Services
 - Peter briefly mentioned a GP Server connected to image server
 - Example of a GP Service: Viewshed
- About Data Structures
 - o Gridded VS Irregular
 - o Terrain (Irregular)
 - Points and breaklines
 - “Tinning” data on the fly
 - Editable and versioned
 - Compact
 - o Raster (Gridded)
 - Highly scalable
 - Fast
 - Compact (through compression)
 - o Optimization methods
 - Creating overviews
 - o Data Management
 - Project-wise management → flows into a complete system
 - The vast majority of uses fall into visualization
 - For those that fall into analysis, users can connect to the service and get results, or download original data
 - Terrain model
 - Applicable in hydrographic modeling, contours, ortho
 - Varying accuracy requirements
 - Recommendations
 - o Store original
 - o Serve rasters as image services
 - o Create terrain
 - o Create a raster from that terrain
 - Add it to the image service
 - Multi resolution

- Create geoprocessing services
- Enable original source download
- Single service for multiple sources
- Optimum format is TIF with LZW compression
- Floats (internally)
- Reference mosaic datasets
 - Can reference GP tasks to the base terrain